United States Patent

[11] 3,597,866

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[21] Appl. No. **1,790**
[22] Filed **Jan. 9, 1970**
[45] Patented **Aug. 10, 1971**
[32] Priority **Jan. 11, 1969**
[33] **Italy**
[31] **4,411 A/69**

[54] **PRESSING MACHINES**
1 Claim, 8 Drawing Figs.

[52] **U.S. Cl.** **38/28,**
38/7, 38/43
[51] **Int. Cl.** **D06f 71/00,**
D06f 71/38
[50] **Field of Search** 38/2, 16,
17, 28, 35, 42, 43, 7—11, 23—26, 20; 100/214,
215, 218, 24, 224, 231, 278, 295, 211, 264;
223/57

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Attorney—Waters, Roditi, Schwartz and Nissen

ABSTRACT: A pressing machine intended for covering fabric articles with a sheet coated at least partially with a thermally sensitive adhesive or for ironing fabrics includes an upper fixed platen and a lower movable platen. Two carriages are provided for introducing fabrics to be treated to the space between the platens, one being inoperative at any given time. The lower platen carries a flexible sheet member sealed at its periphery and capable of being inflated by compressed air, whereby the pressure on the articles is equalized over their whole surface area.

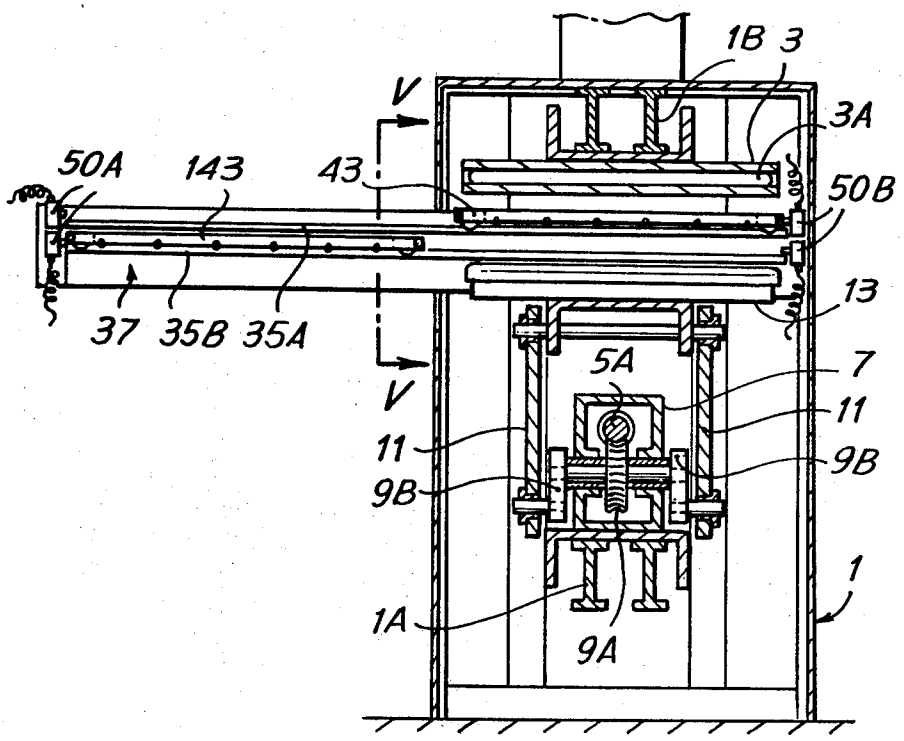


Fig.1

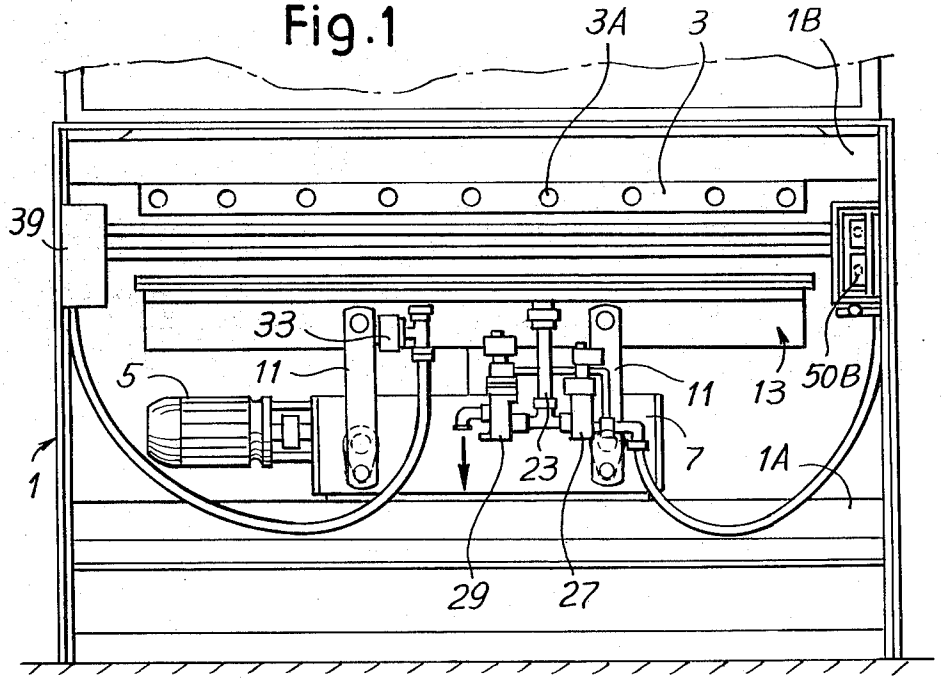

3A
3
1B
39
33
5
11
11
13
50B
1
7
1A
23
29
27

Fig.2

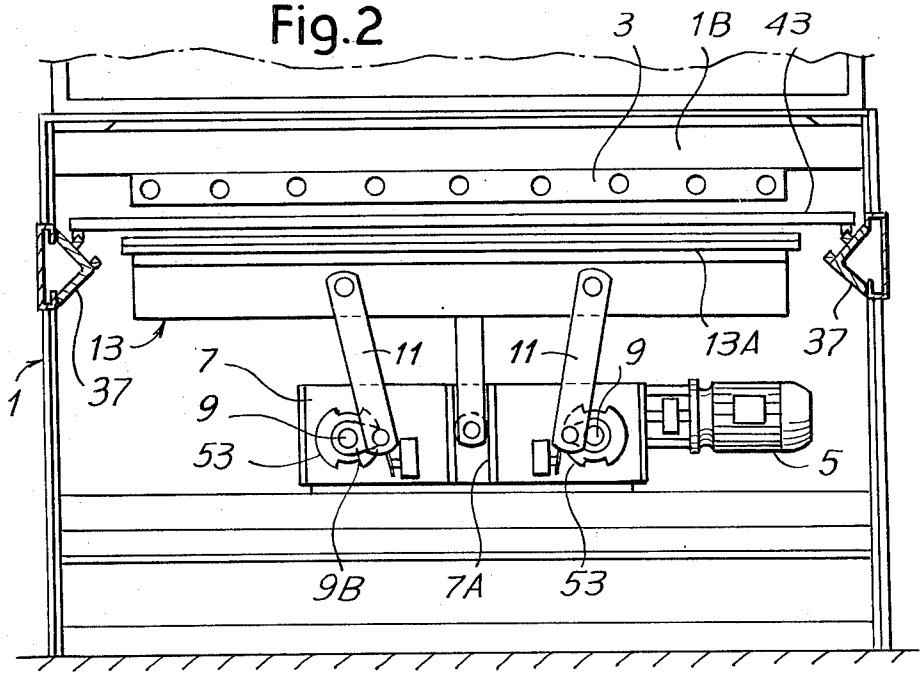

3
1B
43
13
37
1
7
9
53
11
11
9
13A
37
5
9B
7A
53

Fig. 3

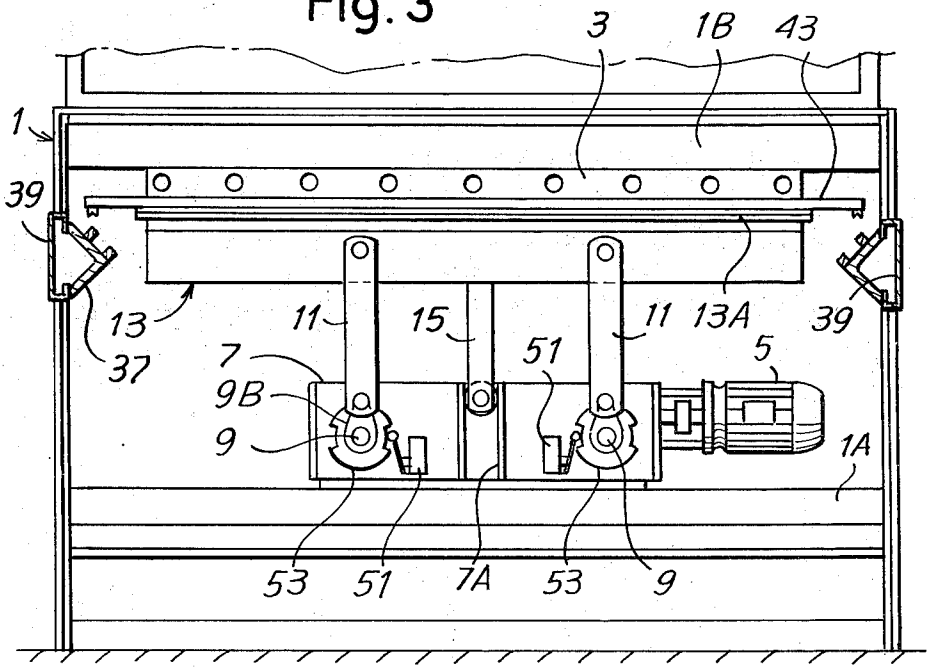

3
1B
43
1
39
13
37
11
15
11
13A
39
7
9B
9
51
5
1A
53
51
7A
53
9

Fig. 4

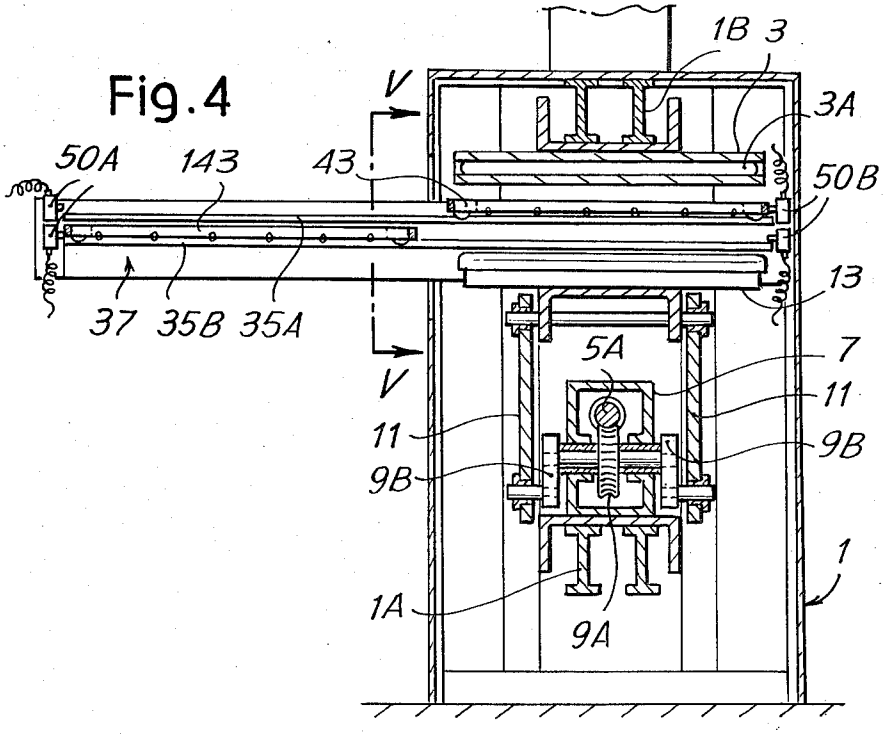

1B
3
V
3A
50A
143
43
50B
13
37
35B
35A
5A
7
11
V
11
9B
9B
1
1A
9A

Fig.5

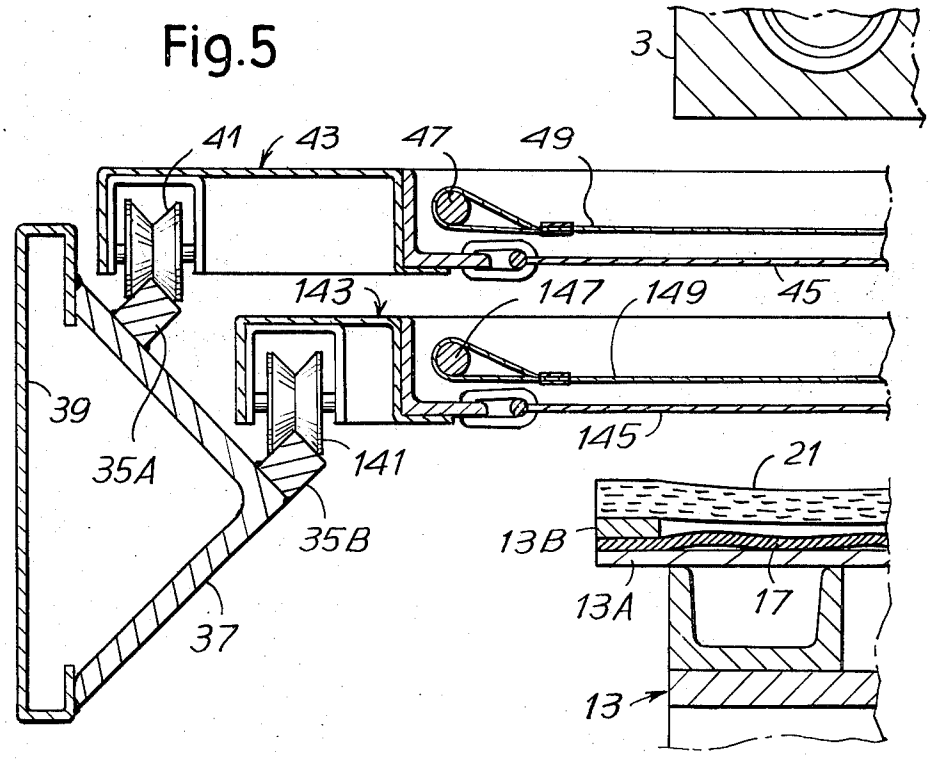
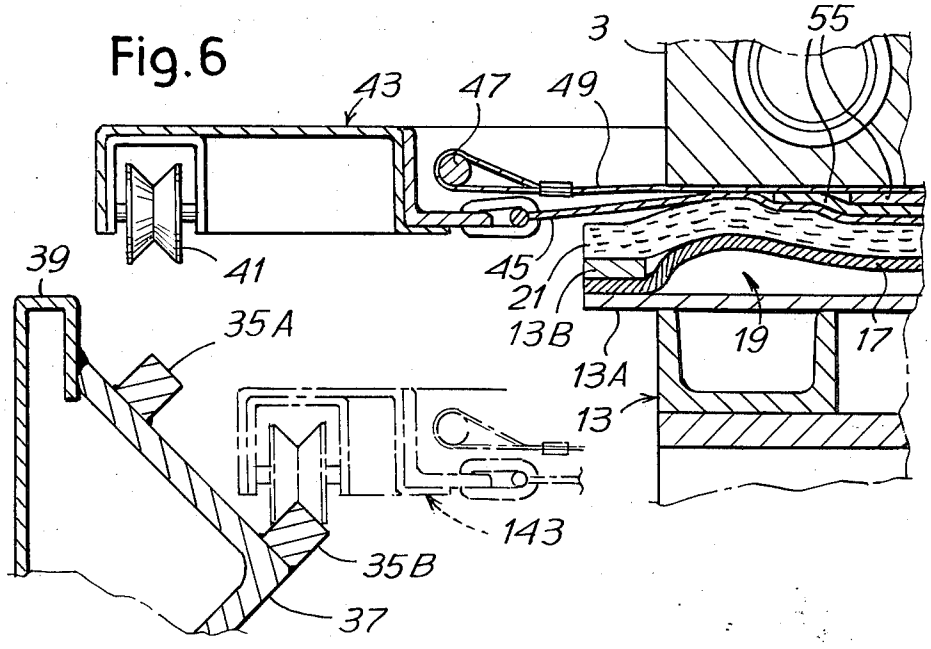

3
41
43
47
49
45
143
147
149
145
39
35A
141
35B
37
21
13B
13A
17
13

Fig.6


3
55
43
47
49
39
41
45
21
13B
19
17
13A
13
35A
143
35B
37

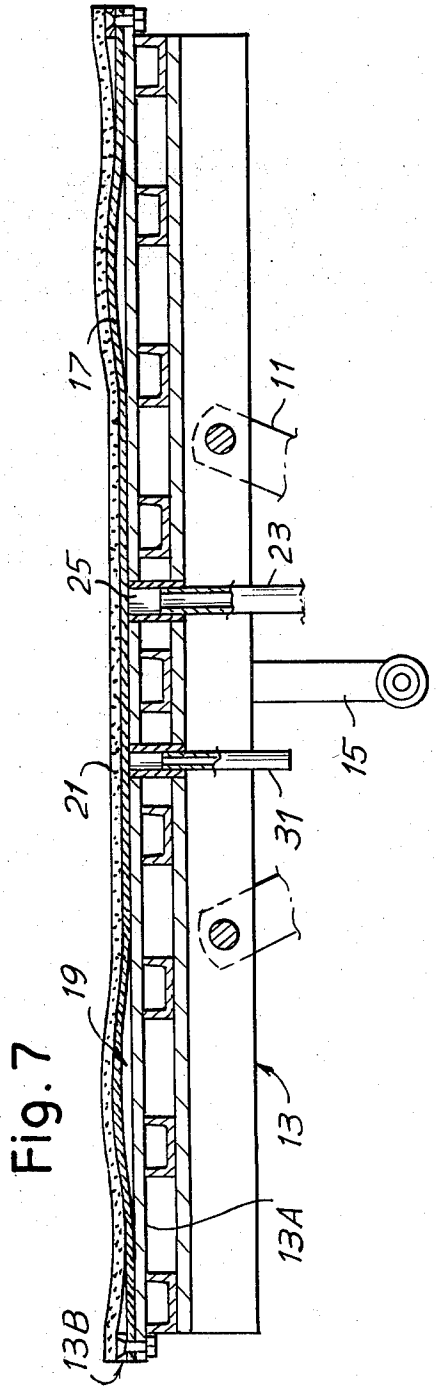


Fig. 7

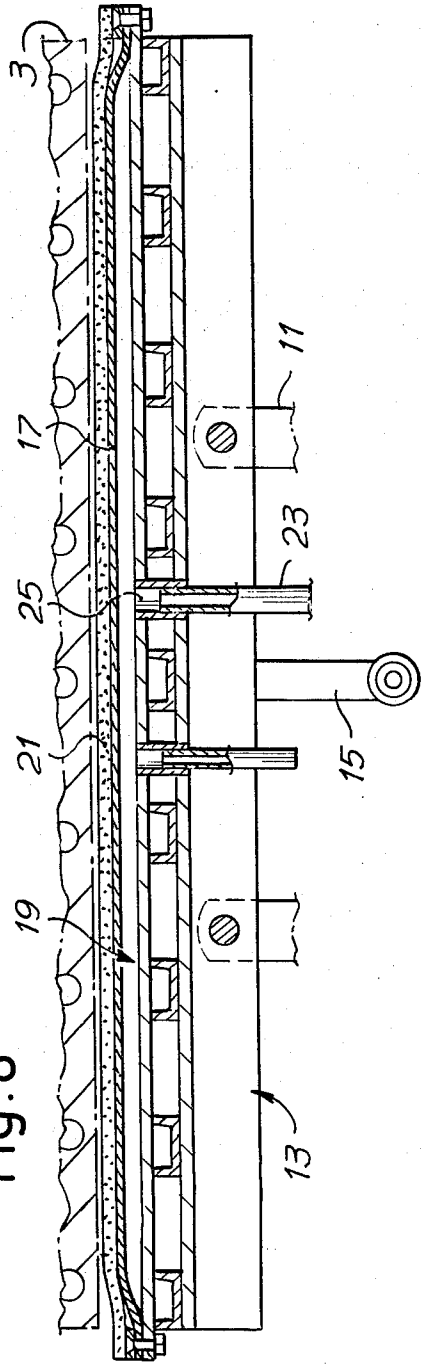


Fig. 8

PRESSING MACHINES

BACKGROUND OF THE INVENTION

1. Field of the invention

This invention relates to pressing machines, for example intended for covering fabrics with a sheet comprising thermally cured adhesive material and intended for ironing of fabrics or textile articles.

2. Summary of the prior art

Machines for treating fabrics in these ways include a structure forming a pressing surface and a structure forming a heated surface, and these two structures are movable relatively to each other. Hitherto, in order to effect pressing, machines have been produced which are able to develop a minimum contact pressure higher than preset limits. The required operational pressure is in general very high, so as to ensure that a minimum pressure is reached at all pressing areas. The high operational pressure requires large-size parts, expensive reinforcements and the installation of a high-power drive. Moreover, a nonuniform pressure is obtained, both because of the lack of rigidity of the structure and because of possible variation in the thicknesses of the material treated in the various areas of a working plate.

An object of the present invention is to provide a pressing machine which overcomes at least partially the disadvantages of prior machines.

SUMMARY OF THE INVENTION

According to the present invention there is provided a pressing machine comprising structure defining a fixed surface, an impermeable and deformable diaphragm sheet member forming a pressing surface arranged to cooperate with the fixed surface, said diaphragm sheet member defining at least in part a sealed chamber, means for moving the diaphragm sheet member towards and away from the fixed surface, and means for inflating the sheet member to perform a pressing operation when the two surfaces are closely spaced from one another.

In a machine, wherein the movable structure forming one of the pressing surfaces, is moved by toggle kinematisms, the intermediate linkages of which are actuated by mechanical control means or the like, according to the invention, said toggle kinematisms are moved to reach a substantial alignment of the hinges (dead point) in the maximum approach array between the two structures, without being requested a high operational power for this; this is possible because the pressing is effected by the deformation of the sheet due to the pressurized fluid admitted after the approach of the two structures, and not by the mechanical movement obtained by the toggle kinematisms.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a rear view of a machine in accordance with the invention;

FIG. 2 is a front elevation, partly in section, of the machine;

FIG. 3 is an elevation similar to that of FIG. 2 but in a second operational configuration;

FIG. 4 is a section on a vertical plane parallel to the direction of movement of carrier frames for articles to be treated in the machine;

FIG. 5 is a section on the line V–V of FIG. 4, to an enlarged scale, with the machine in an open configuration;

FIG. 6 is a view similar to that of FIG. 5 but shows one only of the frames which has been raised for a pressing operation;

FIGS. 7 and 8 each illustrate a section through a movable platen together with a deformable diaphragm sheet in two different configurations.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, a frame 1 includes lower and upper longitudinally extending beams 1A and 1B. A fixed heating platen 3 depends from the upper beams 1B and carries heating means, for example, electrical resistors in recesses 3A. A motor reduction gear assembly includes a motor 5 and a reduction gearbox 7, for example a worm gearbox, with two output shafts 9 extending parallel to each other, and on which there are mounted worm gears 9A (see FIG. 4) meshing with worms integral with a drive shaft 5A. The arrangement of the shaft 5A and the worm gears 9A is such that the two output shafts 9 rotate in opposite senses.

Each of the shafts 9 projects from the gearbox 7 and the respective ends bear a crank 9B. Four cranks 9B of the whole unit, thus drive a corresponding number of rods 11. The rods 11 are pivoted on structure 13 of a lower movable platen of the press, said platen lying parallel and being arranged to cooperate with the fixed heating platen 3. Because of the control provided by the four connecting rod-crank systems 11 and 9B, the platen structure 13 is capable of causing motion in a vertical direction from the configuration of FIG. 1 to the configuration of FIG. 3, through intermediate positions such as that shown in FIG. 2. The structure 13 is guided for increased safety by a slide 15 rigid therewith and moves by means of rollers in guideways 7A formed in the gearbox 7.

The structure 13 (see FIGS. 5 and 8) includes an upper platen 13A, the surface of which carries a flexible and resilient diaphragm sheet 17, of for example, silicone rubber. An edge seal 13B extends around the periphery of the sheet 17 and thus forms a sealed fluid chamber 19 having a volume varying from substantially nil (FIG. 7) to a volume determined by conditions hereinafter described. A flexible sheet or other blanket member 21, which is permeable and preferably a thermal insulator for example made of felt may be arranged on the resilient sheet 17.

The chamber 19 forming a lunglike cavity may be supplied with compressed air or other fluid. A conduit 23 communicates with a bore 25 in the platen 13A, for the air supply. Solenoid valves 27 and 29 respectively control the supply and exhaust of compressed air to and from the chamber 19. A duct 31 leads to a safety pressure control device 33 and a pressure regulator may be provided in the supply conduit.

Two pairs of horizontal guideways formed by square section bars 35A and 35B are carried by right-angled members 37, which extend partly within the sides of the structure 1 and partly on a member 39 projecting from the structure 1. A carriage frame 43 moves with the aid of rollers 41 on the upper bars 35A and the frame 43 has a fabric piece 45 engaged thereto and arranged to cover the surface for the arrangement of the articles to be ironed and/or matched. On the carriage frame 43 there may be pivoted or otherwise located a small sheet support frame 47 carrying a sheet 49 of polytetrafluoroethylene which withstands high temperatures and substantially prevents the adhesion of the materials to be treated, against the heated surface, formed by the platen 3. The small support frame 47, and sheet 49 can be lifted to arrange on the piece of material 45 articles to be ironed, onto which the frame 47 is then lowered together with the sheet 49. A similar carriage frame 143 moves with the aid of rollers 141 on the rails 35B and carries a piece of fabric 145 to receive the articles to be ironed or otherwise treated. The frame 143 has a further sheet support frame 147 having a sheet 149, all these members being similar to corresponding members hereinbefore described for the frame 43. Each of the two carriage frames 43 and 143 is movable on the guideways 45A and 45B respectively to be carried between the platen 3 and the structure 13 separated from each other by the space between the platen 3 and the structure 13. An arrangement is provided which prevents operation of the machine unless one or other of the small frames is inserted correctly between the platens 3 and 13 and the other is completely withdrawn and supported between the members 39. This arrangement may include limit switches 50A and 50B at the ends of the guideways 35A and 35B, which limit switches allow press operation to take place. The press can only be operated under the following two conditions: when one of the frames 43 or 143 actuates one of the

switches 50A, so located as to allow the replacement of treated articles with others to be treated after the associated frame 47 or 147 has been raised; and when the other of the carriage frames 43 or 143 actuates one of the switches 50B, the machine being then in the pressing configuration.

The frame which is located for the pressing configuration between the platens 3 and 13 is raised in its own guideways when it is accommodated by the platen structure 13, 13A, 17 and 21 during the raising effected by the shafts 9. During the subsequent lowering of the platen 13, the raised carriage returns to lie on its own guideways 35A or 35B and is readily centered owing to the tapered profile of the guideways and rollers.

From the lowered configuration shown in FIG. 1, wherein the cranks 9B are downwardly orientated, operation of the motor reduction gear assembly 5, 7, 9 (with the actuation of the limit switches 50A, 50B, at the ends of the guideways 35A, 35B), causes rotation of the shafts 9 of the cranks until the latter reach the upwardly vertically extending position (FIG. 3). In this latter configuration the shafts 9 of the cranks 11 are automatically stopped, for example by means of switches 51 cooperating with cams 53 fast for rotation with the shafts 9. The aforesaid switches also act to stop the shafts 9 in the lower position of FIG. 1.

When the connecting rods 11 are located in the configuration of FIG. 3 and the platen 13 together with the members 17 and 21 is lifted and has raised one of the small carriage frames 43 or 143, the frame is very near the heating platen 3, but not pressed against it, as a result of which the articles 55 (see FIG. 6) arranged between the fabric piece 45 (or 145) and the sheet 49 (or 149) are not yet undergoing the pressing operation.

At this time, control means including the aforesaid solenoid valve 27, act to admit compressed air at the required pressure into the chamber 19, through the valve 27 and the conduits 23, 25, whereby the flexible wall of the chamber 19 presses the articles to be treated against the platen 3, and are shaped by virtue of the flexibility and elasticity of the sheets and superimposition of the sheets of the articles to be treated. The articles are thus pressed at a uniform pressure, independently of the thickness thereof and of the superimposition of several articles. The sheet 49 obviates adhesion to the platen 3, the fabric 45 being shaped according to the thickness of sheets 21 and 17. The thickness of the sheet 21 protects the sheet 17 from excessive heat. The pressure reached in the chamber 19 can be used to determined the stopping of the compressed air supply to the chamber. The pressure control device 33 ensures that the pressure in the chamber 19 and thus the working pressure on the articles 55 does not exceed a predetermined limit. A maximum and minimum pressure gauge (not shown), suitably calibrated, serves for the control of the pressure in the chamber 19 by acting on the valve 27.

While one of the carriage frames 43, 143 is raised from its guideways and in the pressing configuration the other one of the frames is located on the right-angled members 37 for the replacement and the arrangement of the articles to be treated.

After having effected the treatment, pressure release of the chamber 19 is effected through the solenoid valve 29 and then the motor reduction gear assembly 5, 7 is set for the lowering of the platen 13, which is stopped in the lower position for example by cooperation between at least one of the cams 53 and one at least of the switches 51. In this configuration the frame which has undergone the pressing is moved outwardly on the members 37 and conversely the other frame is moved to the position between the platens 3 and 13.

The motion of the platen 13 is effected while no substantial pressing force acts thereon and thus the size of the motor reduction gear assembly can be small. When stresses resulting from pressing are evident, the connecting rods 11 and the cranks 9B are located substantially at the upper dead point and thus under the best conditions to withstand the forces.

The machine may include means to adjust rapidly the operational pressure.

The machine hereinbefore described ensures uniformity of pressing, speedy attainment of pressing pressure, structural simplicity, low power requirements, adjustability of the operational pressure and rapid variation thereof, and continuous control of the operational pressure.

What we claim is:

1. A pressing machine, comprising;
structure defining a fixed surface,
an impermeable and deformable diaphragm member forming a pressing surface arranged to cooperate with the fixed surface, said diaphragm member defining at least in part a sealed chamber,
means for moving the diaphragm member towards and away from said fixed surface,
two carriages for interposing material to be pressed into the space between the surfaces,
guideways supporting the carriages,
means for inflating the diaphragm member to perform a pressing operation when the two surfaces are closely spaced from one another, and
control means for rendering the moving means inoperative if the carriages are incorrectly positioned.